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Investigation of ion-scale waves within a global hybrid-Vlasov simulation

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Waves are ubiquitous in near-Earth space and play an important role in the coupling between its different regions. From the formation of turbulent structures to their impact upon particle precipitation within the ionosphere, the understanding of these waves is a key point to the understanding of space weather events. Here we use the novel Vlasiator global hybrid-Vlasov simulation to investigate the various types of ion-scale waves present in the magnetosheath and the foreshock. We identify the wave modes and we compare them to existing plasma and dispersion solvers results, such as the Arbitrary Linear Plasma Solver, in order to validate the simulations. We discuss their relation with the proton velocity distribution functions, as the hybrid-Vlasov approach provides us with noise-free distribution functions throughout the simulation domain. These results will be used to later investigate the behaviour and impact of the present waves on processes such as particle precipitation.